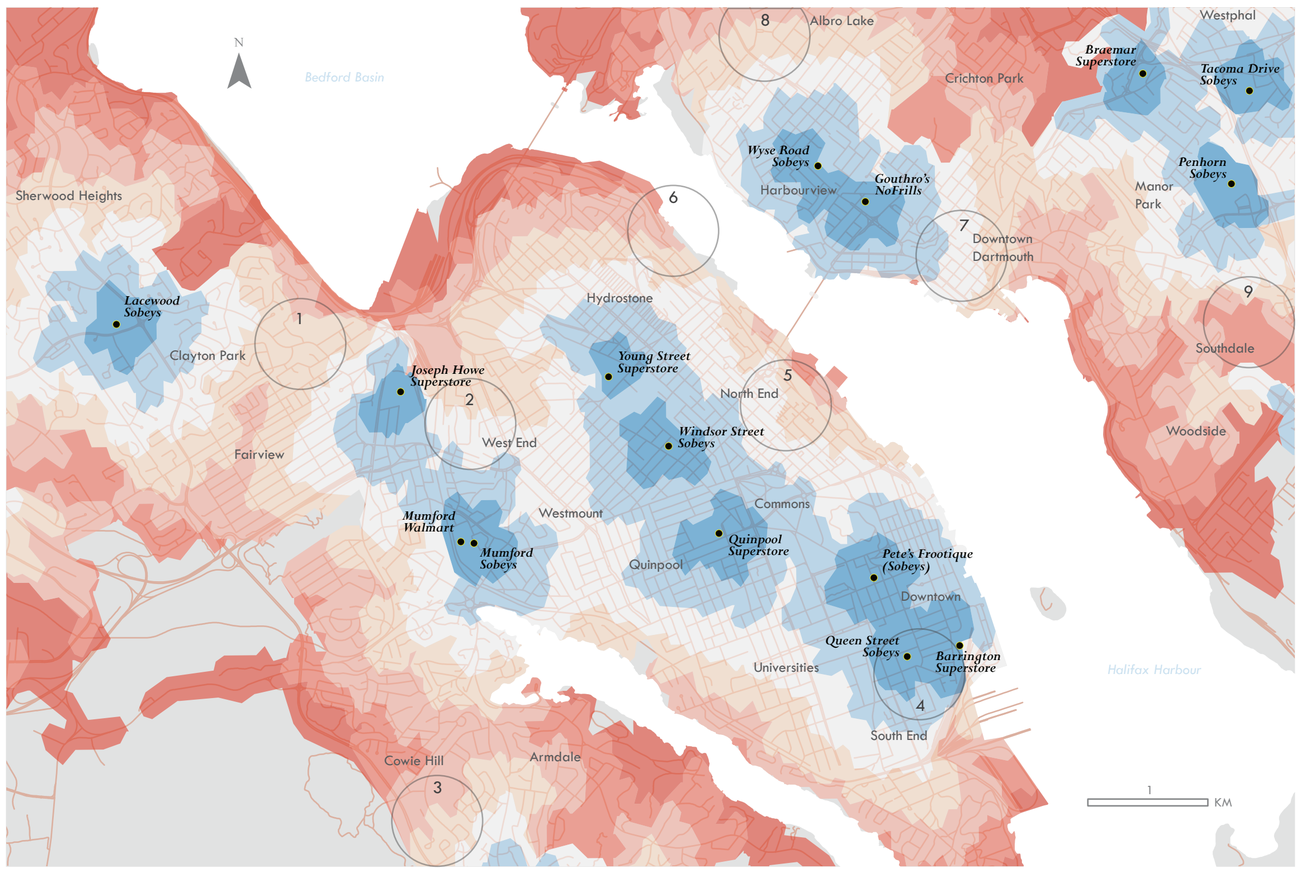


Walking distances to grocery stores

- Grocery store
- Good access
  - 5 minutes
  - 10 minutes
- Neutral
  - 15 minutes
- Concerningly inaccessible
  - 20 minutes
  - 25 minutes
  - 30 minutes
  - 45 minutes
- Outside of data range
- Low-income area

1 Lacewood
2 West End
3 Cowie Hill
4 South Downtown
5 North End
6 Mulgrave Park
7 Downtown Dartmouth
8 Highfield Park
9 Southdale

Food Deserts

in urban Halifax/Dartmouth

Methodology

This map poster diptych concerns food deserts, which are defined as "urban neighborhoods where residents have little or no access to stores that provide fresh, healthy and affordable foods." (Canadian Environmental Health Atlas, n.d) These areas are usually served by convenience stores, fast food outlets, or other less healthy and affordable options. Food deserts tend to impact low-income areas, and result in worse health outcomes for residents. In this project, data was gathered for locations of chain grocery stores: Sobeys, Atlantic Superstore, NoFrills, Independent, Foodland, Walmart, and Costco. The addresses were collected in an Excel document, georeferenced and then placed in ArcGIS Pro, with individual placement adjustments for real-location accuracy. In other studies of urban food deserts in Canada the measure used is distance in meters to a supermarket; in this case the Network Analysis tool in ArcGIS Pro was used to generate a map of walking times.

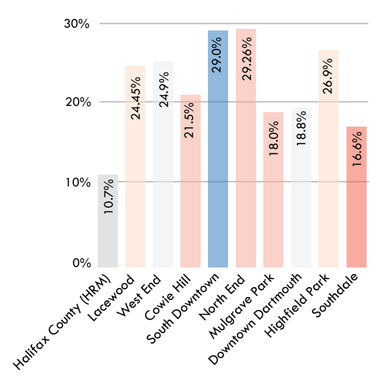
Findings

The walking time polygons were generated using ArcGIS Pro's Network Analysis tool, calculating from a built-in network via 'www.arcgis.com.' The Service Area setting was used with the input grocery store locations to produce intervals of 5, 10, 15, 20, 25, 30 and 45 minutes. Five to ten minutes are shown in blue, and considered an accessible walking time, fifteen is neutral, twenty and upwards is concerningly inaccessible and shown in increasing shades of red. The result is a general view of grocery store dispersal in the city. The central residential and downtown sections of the Halifax peninsula have plenty of blue areas. Dartmouth has scattered access in downtown residential areas and more options leading towards the outer neighborhoods. Inconsistencies appear where forty-five-minute polygons come up against fifteen-minute ones, suggesting an error with the network used in the analysis. Many of the forty-five minute areas appear in either parks, or private and industrial land, and grocery store access is less relevant than in residential areas where a higher number of people live and go to and from.

Poverty and Food Deserts

Comparative approaches use census dissemination areas as locational data to determine food deserts, making the results easier to directly compare with maps breaking down income. Areas of low-income based on the census findings depicted through Census Mapper were highlighted by the cartographer with corresponding infographics. Notice that while not all of the low-income areas correlate with the furthest walking distances, many of them are in the neutral to concerning distance range. For anyone in these areas with physical or mobility issues, their access becomes even more limited. For more information go to Census Mapper: https://censusmapper.ca/-maps/3350?index-=0#13/44.6520/-63.5878.

Percentage of people experiencing low income -
average of percentages in census dissemination areas making up neighborhoods of focus (data from Census Mapper, 2021)



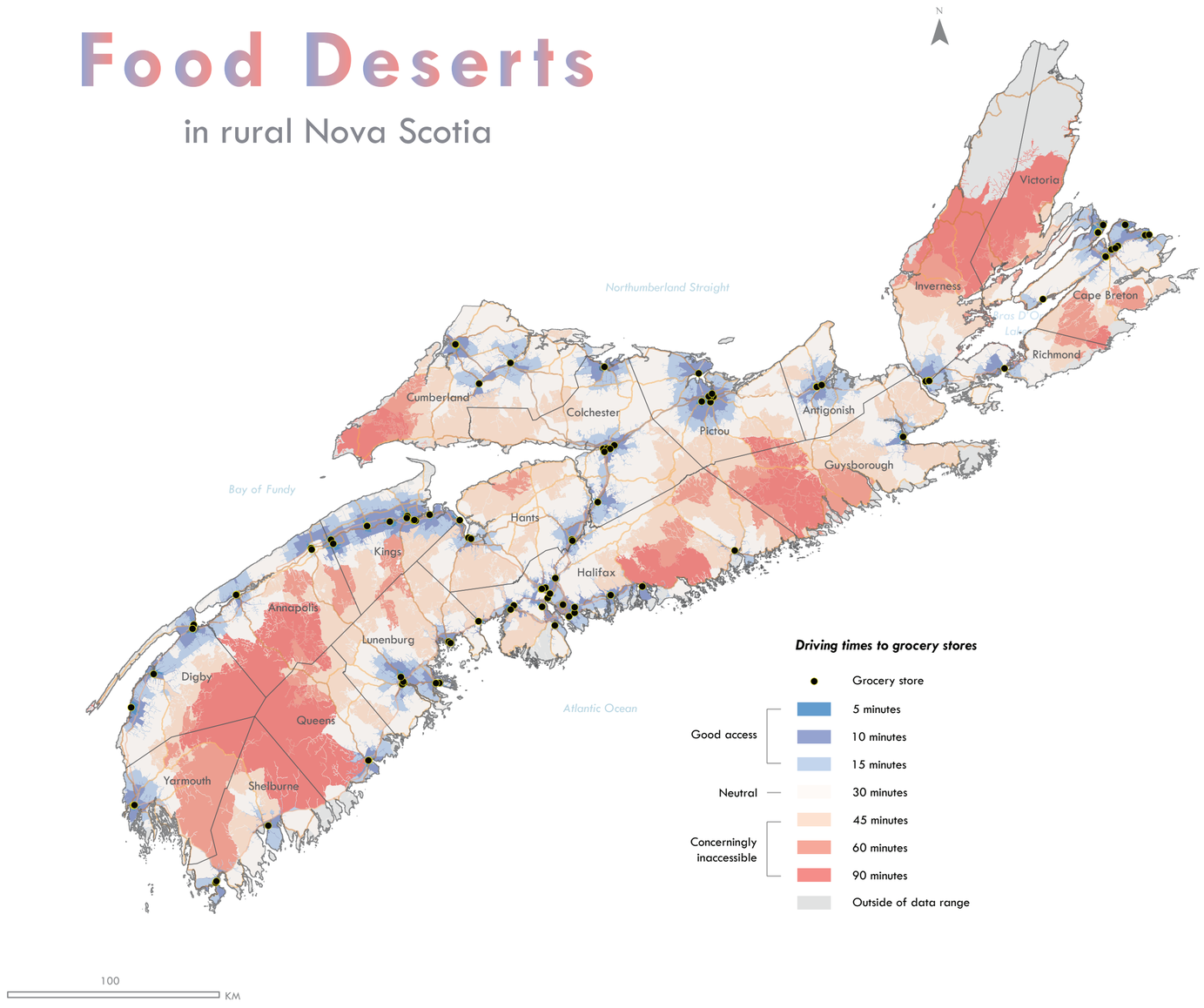
Colours are assigned to convey the estimated overall severity of grocery store inaccessibility per low-income area

Urban Variety

In a 2014 Winnipeg study, findings showed that "in many downtown areas, smaller local grocery stores may play an extremely important role in providing easy access to a wide range of affordable food products. As shown in this study, taking into account proximity to local full-service grocery stores in addition to national chain stores decreased the estimate of the population affected by food deserts in the Winnipeg Health Region by 38%." (Slater et al, 2014) The Halifax map focuses on national chain grocery stores. Accounting for the presence of convenience stores, small independent grocers, and farmers markets in urban Halifax and Dartmouth would create a different result. However, factors in these alternatives like price markups and the quality and freshness of the food being sold would create multiple other dynamics to take into consideration. This a flaw in the theory of 'food deserts' themselves: is it only about access, or access to *what*? Answering these social questions using cartography poses many challenges.

Food Deserts

in rural Nova Scotia



Driving times to grocery stores

- Grocery store
- Good access
  - 5 minutes
  - 10 minutes
  - 15 minutes
- Neutral
  - 30 minutes
- Concerningly inaccessible
  - 45 minutes
  - 60 minutes
  - 90 minutes
- Outside of data range

Findings

The drive times were calculated using the ArcGIS Pro Network Analysis tool, with the 'www.arcgis.com' network. The Service Area setting was used to calculate the distances, looking at drive times of 5, 10, 15, 30, 45, 60 and 90 minutes. Five to fifteen is considered good access and shown in decreasing tones of violet, thirty is neutral in off-white, forty-five to ninety is considered concerningly inaccessible and shown in increasing shades of red. The coastal/interior divide follows population patterns, leaving rural residents in the interior of Nova Scotia most at risk of being in food deserts. Given the issues with 'www.arcgis.com' network reliability, not every 90-minute polygon is fully accurate. However, *most accurate* areas of concern appear in western Guysborough, north-eastern Halifax, Yarmouth, Inverness and Cumberland counties. Lunenburg, Colchester, Pictou, Antigonish and south-western Halifax counties are comparatively better served.

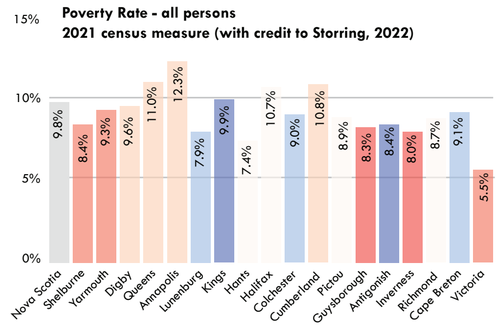
Methodology

Most studies of food deserts in Canada focus on urban phenomena. Food deserts tend to most impact low-income residents with less buying power in urban areas (Cummins et al, 2002). Nova Scotia has one of the highest poverty rates in Canada; and within the province the highest poverty rates by county show up in Annapolis, Queens and Cumberland and Halifax, three of which are rural. Taking this into consideration, I decided to explore the possibility of rural food deserts as well as urban ones. The data is limited to full-service chain grocery stores, showing results with the caveat that gas stations, farm markets, co-ops, and individual sales/gardens are alternatives to potentially distant full-service stores. Prices and availability at these alternatives may vary depending on markups and time of year. As such, these preliminary findings are limited in their understanding of such a large, complex issue.

Poverty and Food Deserts

Census data from 2021 shows Nova Scotia tied with British Columbia for highest poverty rate in Canada at 9.8% for all persons, making it a province of concern (Storring, 2022). Given the correlation between low-income urban neighbourhoods and food deserts, the same consideration was taken for low-income rural counties.

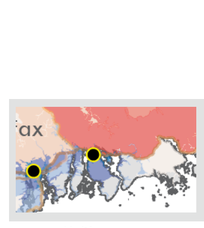
Poverty Rate - all persons
2021 census measure (with credit to Storring, 2022)



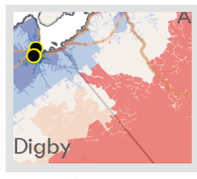
Colours are assigned to the columns to show the estimated overall severity of grocery store inaccessibility per county

Network Analysis Issues

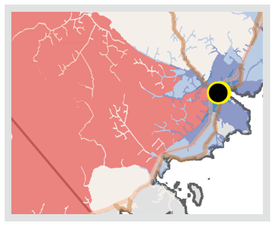
DISCLAIMER: this map requires further research to be complete and accurate. It is a preliminary finding. The 'www.arcgis.com' network used to run the Network Analysis tool has generated inaccurate polygons showing 90-minute drivetimes that butt up against ten and fifteen-minute polygons and don't accurately depict driving distance in three prominent cases. These inaccurate areas occur in Queens, Digby, and Halifax counties, as shown below. Upon closer inspection, the tool filled in the *roads* in the mistaken 90-minute area with observationally correct drivetime colours but filled out the remaining space in red, giving a discordant and inaccurate visual result. To use this tool more effectively in the future, the network would need to be updated, or an independent network created from which to run the calculations.



Halifax county



Digby county



Queens county

Cartography by Hannah Genosko, 2023
This map is produced as a portion of the requirements of the GIS: Cartography and Geovisualization program
of the Centre of Geographic Sciences, NSCC, Lawrencetown, Nova Scotia. The product is unedited, unverified and intended for educational purposes only.

Data credits: GeoNova, Open Data Nova Scotia, Statistics Canada, Esri ArcGISPro Network